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**

October 2, 1998

**Special Provisions for:

Open-Graded Asphalt Friction Course (OGAFC), Class I
Polymer Modified Bituminous Concrete Mixtures
Superpave Bituminous Concrete Mixtures

These special provisions were revised by the Bureau of Materials and Physical Research. The major changes to the special mixture special provisions consist of the following:

1. Making the polymer modified asphalt cement sections from each of the specs consistent with one another by adopting the Performance Graded (PG) asphalt binder specifications from the Superpave spec.
2. Relaxing the one-hour maximum silo storage time for polymer mixtures in each spec by stating, "The mixture shall not be stored more than one hour without approval of the Engineer. The Engineer will assess the draindown of the mix in making this determination."
3. Relaxing the requirement of having the manufacturer's representative from the polymer producer present at all times during production of polymer mixtures by stating, "A manufacturer's representative from the polymer asphalt cement producer shall be present during each polymer mixture start-up and shall be available at all other times during production and lay-down of the mix to provide technical assistance."

The districts should include the BDE Check Sheet with the applicable BDE Special Provisions marked for the January 15, 1999 letting and for subsequent lettings and the Project Development and Implementation Section will include the paper copy in the contract.

This special provision will be transferred through Microsoft Exchange to the district offices on October 2, 1998.

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POLYMER MODIFIED BITUMINOUS CONCRETE MIXTURES (BDE)

Effective: April 1, 1998

Revised: January 1, 1999

Description. This Special Provision establishes and describes the responsibilities of the Contractor in producing and constructing polymerized bituminous concrete mixtures Class I. This work shall be according to the applicable portions of Section 406 of the Standard Specifications and the following.

Materials.

- (a) Reclaimed Asphalt Pavement (RAP). RAP will not be permitted in polymerized bituminous concrete mixtures.
- (b) Modified Performance Graded (PG) Asphalt Cement. The asphalt cement shall meet the requirements of AASHTO MP 1 "Standard Specification for Performance Graded Asphalt Binder" for the grade shown on the plans. Elastomers shall be added to the base asphalt cement to achieve the specified performance grade and shall be either a styrene butadiene diblock or triblock copolymer without oil extension or a styrene butadiene rubber. Air blown asphalts and other modifiers will not be allowed.

Modified PG asphalt cements shall be supplied from a certified asphalt refinery or terminal and will be accepted according to the latest revision of the Bureau of Materials and Physical Research Policy Memorandum, "Performance Graded Asphalt Binder Acceptance Procedure". Asphalt modification at bituminous mixture plants will not be allowed. The modified asphalt cement shall be smooth, homogeneous, and comply with the requirements given in Table 1 or 2 for the grade shown on the plans.

Table 1
Requirements for Styrene-Butadiene Copolymer (SBS) Modified Asphalt Cements

Test	Asphalt Grade SBS-PG64-28 SBS-PG70-22 SBS-PG70-28	Asphalt Grade SBS-PG76-22 SBS-PG76-28
Separation of Polymer ^{1/} , 163 °C (325 °F.), 48 hours, difference in R & B from top to bottom sample, °C (°F.), maximum	2 (4)	2 (4)
Force Ratio ^{2/} (f_2/f_1), 4 °C (39.2 °F.), 50 mm/min., 300 mm elongation, minimum	0.3	0.35
TESTS ON RESIDUE FROM ROLLING THIN FILM OVEN TEST		
Elastic Recovery ^{3/} , 25 °C (77 °F.), 100 mm elongation, % minimum	60	70

Table 2
Requirements for Styrene-Butadiene Rubber (SBR) Modified Asphalt Cements

Test	Asphalt Grade SBR-PG64-28 SBR-PG70-22 SBR-PG70-28	Asphalt Grade SBR-PG76-22 SBR-PG76-28
Separation of Polymer ^{1/} , 163 °C (325 °F.), 48 hours, difference in R & B from top to bottom sample, °C (°F.), maximum	2 (4)	2 (4)
Toughness ^{4/} , 25 °C (77 °F.), 500 mm/min. (20 inches/min.), Newton-meters (inch-pounds), minimum	12.5 (110)	12.5 (110)
Tenacity ^{4/} , 25 °C (77 °F.), 500 mm/min (20 inches/min.), Newton-meters (inch-pounds)	8.5 (75)	8.5 (75)
TESTS ON RESIDUE FROM ROLLING THIN FILM OVEN TEST		
Elastic Recovery ^{3/} , 25 °C (77 °F.), 100 mm elongation, %, minimum	40	50

1/ The separation of polymer from asphalt shall be evaluated as follows:

Carefully heat the sample, avoiding localized overheating, until sufficiently fluid to pour.

Strain the melted sample through a 300 µm (No. 50) sieve and stir thoroughly.

Pour 50.0 grams of sample into a thin-wall aluminum tube having approximate dimensions of 25 mm (1 in.) diameter by 140 mm (5 1/2 in.) length. Fold the excess tube over two times and crimp to seal.

Place the sealed tube vertically in a 163 ± 6 °C (325 ± 10 °F.) oven. Allow the tube to stand, undisturbed, in the oven for a period of 48 ± 1 hours. At the end of the heating period, immediately place the tube in a freezer at -7 ± 6 °C (20 ± 10 °F), keeping the tube in a vertical position at all times. Leave the tube in the freezer for a minimum of 4 hours to completely solidify the sample.

Upon removing the tube from the freezer, place on a hard flat surface and cut the tube into three equal length portions with a sharp spatula and hammer. Place the top and bottom portions into separate marked beakers and heat in a 163 ± 6 °C (325 ± 10 °F) oven until sufficiently fluid.

Remove the pieces of aluminum tube, stir thoroughly, and pour the top and bottom samples into marked softening point rings. Determine the softening point of the top and bottom portions of the sample simultaneously according to AASHTO T 53.

2/ The force ratio is defined as the force at 300 mm elongation (f_2) divided by the maximum force at the initial peak (f_1) and shall be determined according to AASHTO T 300.

3/ The elastic recovery shall be performed according to AASHTO T 51 with the following modifications:

The standard v-shaped sides for the specimen mold shall be replaced by straight-sided inserts of the same length so the specimen will contain a section 10 mm x 30 mm.

The sample shall be elongated to 100 mm and then immediately cut approximately in half with scissors.

After 1 hour in the bath, the ends of the cut sample shall be brought together to just touch and the length of the recovered sample measured and recorded as A. The percent elastic recovery (R) shall be calculated as follows:

$$R = 100 - A$$

4/ Toughness and tenacity shall be determined according to ASTM D 5801.

Plants. Mix plants used to produce the mixture shall be according to Article 1102.01 of the Standard Specifications and the following:

- (a) Asphalt Cement. The polymer modified asphalt cement shall be shipped, maintained and stored at the mix plant according to the manufacturer's requirements. Polymer asphalt cement shall be placed in an empty tank and not blended with other asphalt cements.
- (b) Hot-mix Storage. The mixture shall not be stored more than one hour without approval of the Engineer. The Engineer will assess the draindown of the mix in making this determination.

Mix Production/Placement. The mixtures shall be produced at a temperature range recommended by the polymer asphalt cement producer to allow adequate compaction. The actual production temperature will be selected from the range by the Engineer based on individual plant characteristics and modifier used.

The mixture shall be placed at or above a minimum mix temperature recommended by the polymer asphalt cement producer and approved by the Engineer. The mixture temperature shall be measured in the truck just prior to placement in the paver.

Pneumatic-tired rollers will not be allowed.

A manufacturer's representative from the polymer asphalt cement producer shall be present during each polymer mixture start-up and shall be available at all times during production and lay-down of the mix.

Basis of Payment. This work will be paid for at the contract unit price per metric ton (ton) for POLYMERIZED BITUMINOUS CONCRETE of the mixture specified.

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